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TITLE: System and method for dynamic price determination in differentiated services computer networks

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**ABSTRACT:** A system and method for dynamically determining a price for priority service on a computer network, such as a Differentiated Services Internet. A computer system, such as an Internet Service Provider (ISP) determines a price based on the amount of traffic currently on the network. Traffic data is gathered by polling, or querying, various network connected devices, such as routers, switches, and other computer systems. Based on the traffic data a price is determined and provided to a user that is interested in using high priority network service. If the user chooses to receive the high priority network service, the dynamic price is applied to the user's account and multiplied by the amount of time the user uses the high priority service. When the user is finished using the high priority service, he informs the ISP and the appropriate charges are applied to the user's network services invoice.

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Summary of Invention Paragraph - BSTX (15): [0014] Users can request high priority treatment which causes packets sent to and from the user to be marked, or flagged, as high priority packets. The amount of time the user is operating as a high priority user is recorded so that the user can be billed accordingly. When the user requests high priority treatment, the server (ISP) marks the time that the user began using the high priority service and the price that was either quoted by the server or that was current at the time the request was made. When the user no longer wishes to operate in a high priority mode, he can turn off the service upgrade request at which time the user's packets are marked as normal priority packets to which flat rate or normal billing rates apply. The server intercepts the client's request to return to normal priority service and marks the billing file accordingly. At the end of a billing cycle, the user's Internet Service Provider calculates the amount of time the user spent as a high priority user and determines a price by combining the normal (or flat) rate changes with the high priority charges incurred by the user.

Detail Description Paragraph - DETX (3): [0031] FIG. 1 shows a system diagram of a computer system using high and normal priorities. Client computer system 100 is connected to computer network 110, such as the Internet. Client computer system 100 can be connected to computer network 110 in a variety of ways. For example, client computer system 100 can use a modem to dial into an Internet Service Provider (ISP)

that allows client computer system 100 access to computer network 110. Client computer system 100 could also use a cable modem connection, a DSL connection, a satellite connection, or an ISDN connection to access computer network 110. The user of client computer system 100 can choose to use higher speed service or lower speed service. When the user chooses to use higher speed service, then higher speed packets 120 are sent to and from client computer system 100. During normal operations, when the user does not need higher speed service, lower speed packets 130 are sent to and from client computer system 100. The priority of the packets is determined by analyzing the header area included with the packets. Among other things, the header area determines the destination of the packet and the priority assigned to the packet. Both higher speed packets 120 and lower speed packets 130 travel across computer network 110 to a destination computer system, such as server computer system 150. Server computer system 150 receives request packets 140 from various client computer systems, including client computer system 100, processes the requests, and returns response packets 160 to the client computer systems that made the corresponding requests. When a request packet includes a higher priority header, the server includes the higher priority header information in the corresponding response packet. In this manner, the higher priority packets both arrive at the destination computers in a prioritized fashion and are returned to the requesting client computer in a prioritized fashion. The return trip back to the client computer is often more important for prioritized processing because the client computer is often requesting large data files or data streams, such as those including multimedia content. These larger files benefit from prioritized processing in that larger files generally take longer to transmit over the Internet, especially during peak usage periods. However, with prioritized processing, the user is able to receive the content within a needed timeframe. To keep track of the user's prioritized processing, billing computer system 170 monitors the traffic to and from client computer system 100. In order to monitor the traffic, billing computer system 170 may be incorporated within the client's ISP. Packets traveling to and from the client computer system pass through the ISP on their way to or from the Internet. Billing computer system 170 analyzes the packet headers to determine which client computer is sending or receiving the packets. When prioritized header information is included in the packets, billing computer system 170 records the client's use of prioritized service in billing records data store 180. Various billing plans can be established for use of prioritized service. For example, users could purchase a certain amount of prioritized service per month as part of their regular Internet service bill, with additional prioritized service being charged on a per-minute basis. At the end of a billing cycle, billing computer 170 reads the recorded billing records 180 and prepares a network usage bill 190 for each of the ISP's customers.

Detail Description Paragraph - DETX (7): [0035] On the other hand, if the customer requested a service upgrade, decision 310 branches to "yes" branch 335. During a service upgrade, the header area of the customer's packets are marked to reflect the higher priority setting (step 340). The customer's use of the service upgrade is recorded in the customer's billing records (step 350). The higher priority packet marking and service upgrade charges continue until the customer requests that the service upgrade period be stopped or when the user signs off.

Detail Description Paragraph - DETX (8): [0036] In either case, after the packets are marked and the appropriate information is captured in the billing records, the customer sends request packets and receives responsive packets from servers or other content providers (step 360). A determination is made as to whether the user has signed off (decision 370). If the user has not signed off, "no" branch 375 is taken looping back to decision 310 to check whether the user is requesting a service upgrade. This looping continues until the user requests to sign off, at which time "yes" branch 385 is taken and processing ends at 390.

Detail Description Paragraph - DETX (14): [0042] FIG. 6b shows a flowchart for daemon processing for accepting or rejecting service upgrade pricing. Daemon processing begins at 620 whereupon a decision is made whether the user has requested a network service upgrade (decision 625). If the user has not requested a network service upgrade, "no" branch 626 is repeatedly taken looping back to the beginning of the processing until the user requests a network service upgrade. Daemon processing can also be programmed to wait for the user to request a service upgrade by using a semaphore or other type of interrupt to indicate that the user wishes to upgrade his or her network service. When the user requests to upgrade the network service, "yes" branch 628 is taken whereupon the current upgrade pricing is requested from the network service provider (step 630). This pricing information is received and an appropriate dialog window is displayed for the user including the current pricing information (output 640, see FIG. 6a for an example dialog box). The user's selection is received (input 650) based on the information provided to the user. If the pricing is accepted by the user, decision 660 branches to "yes" branch 665 whereupon the network service provider is notified (output 670) to begin marking the user's packets with priority headings and charging the user for priority service. On the other hand, if the pricing is not accepted by the user, decision 660 branches to "no" branch 675 whereupon the network service provider is not notified that the user wishes to upgrade service and normal pricing and service levels are maintained (step 680). Additionally, if the user was currently in an upgrade mode, step 680 would operate to reset the user's priority and pricing to normal levels with the network service provider. After the user's selection has been processed, daemon processing ends at 690. Note that daemon processing may be iterative to provide continuous monitoring of the user's service requests, however FIG. 6b illustrates the processing of one such service request.

Detail Description Paragraph - DETX (21): [0049] If the client is not inquiring about current upgrade pricing, decision 920 branches to "no" branch 942 whereupon the client's service request is parsed and processed (step 945). A determination is made as to whether the client is requesting to start using upgraded network service (decision 950). If the user is not requesting to start using upgraded network service (i.e., the request is to stop using upgraded service), decision 950 branches to "no" branch 952 and the stop time is written to client's billing records 980 and the server (ISP) stops marking the client's packets for prioritized handling (step 955). On the other hand, if the request is to start prioritized service, decision 950 branches to "yes" branch 958 whereupon a determination (decision 960) is made as to whether a price quote was

included in the client's upgrade request (the price quote being the results of a prior price check by the client). If price data is not included (or another exception occurs such as the price quote having an old timestamp or being invalidated), decision 960 branches to "no" branch 962 whereupon current pricing information is read (step 965) from pricing data store 930. On the other hand, if valid price quote data is included with the service upgrade request, decision 960 branches to "yes" branch 968 and the included price information is extracted from the client's request (step 970). A timestamp corresponding to the upgrade service request is written to client's billing records 980 along with the price that was quoted or read and the server or ISP begins prioritized handling of the client's packets until the client requests to stop the prioritized marking with a subsequent stop request.